



# Drive and Motion Systems for **Agriculture**





# People Finding A Better Way<sup>®</sup>

Established in **1904**. Employing **42,000** people across **141** major facilities in **31** countries. Shipping to **14,000** customers, leveraging a global network of technology centers across **9** countries

### Our Vision

Powering Innovation  
To Move Our World

### Our Mission

This mission is embodied in our company theme: People Finding A Better Way. Driving stakeholder value by:

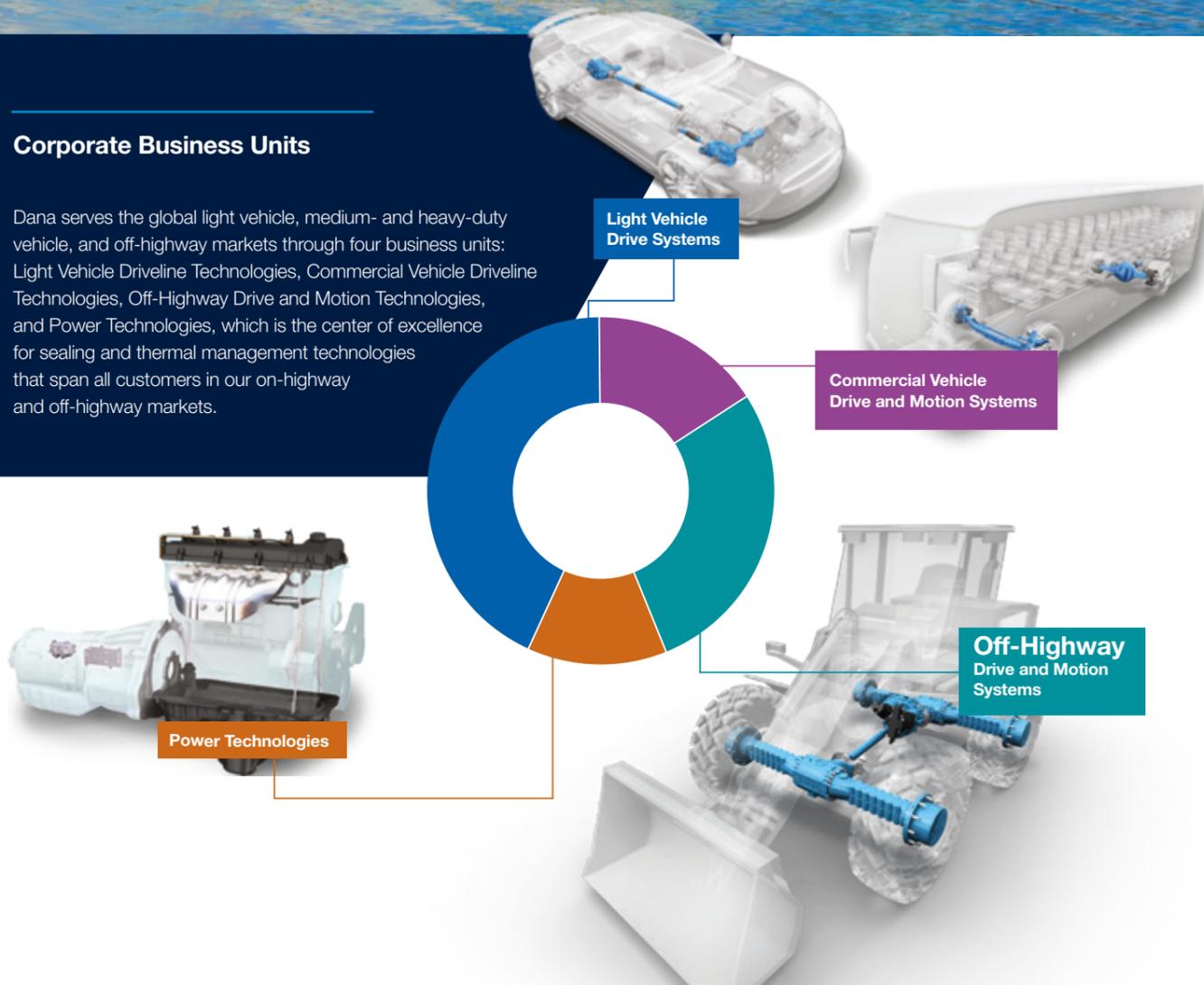
- powering vehicles and machines around the world
- shaping sustainable progress through invention and execution
- making the amazing happen wherever people live, work, and play.

### Our Values

- Value Others
- Inspire Innovation
- Grow Responsibly
- Win Together

### Corporate Business Units

Dana serves the global light vehicle, medium- and heavy-duty vehicle, and off-highway markets through four business units: Light Vehicle Driveline Technologies, Commercial Vehicle Driveline Technologies, Off-Highway Drive and Motion Technologies, and Power Technologies, which is the center of excellence for sealing and thermal management technologies that span all customers in our on-highway and off-highway markets.



## Where there is a need, Dana finds a better way.

### A new era of mobility is upon us.

Emissions regulations and government policies are manifesting at an ever-increasing pace, and visions of vehicles that reduce operating costs while enhancing productivity and safety are accelerating the need for alternative propulsion solutions.

For over 20 years, our group of highly focused engineers has been dedicated to the research and development of new technology solutions aimed at electrification. We have built a broad portfolio of award-winning, patented technologies, making us a leader in electrification.

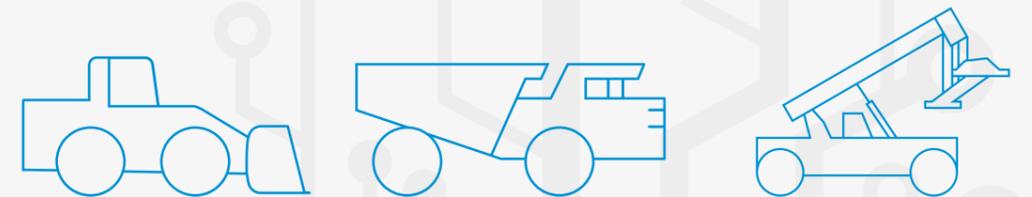
## Why should you rely on Dana?

### Solutions designed, engineered, and manufactured for maximum efficiency.

We approach electrification with a trained eye and an insightful, innovative perspective, utilizing market synergies to provide an advantage in electrifying offerings across multiple applications.

A component is only as good as the system in which it operates. That's why we take a systems-focused approach, seamlessly integrating our components into complete electrified systems.

We have an in-house, multi-disciplinary team of system solutions engineers who provide turnkey software and controls for our entire portfolio of technologies. This in-house knowledge and integration produces solutions that provide enhanced performance, packaging optimization, and reduced system weight. All of which results in savings to your bottom line.



OFF-HIGHWAY VEHICLES



LIGHT VEHICLE



COMMERCIAL VEHICLE



**WEIGHT REDUCTION**  
For additional payload or battery capacity



**EFFICIENCY**  
Reduced energy consumption means increased range and cost savings



**PACKAGING**  
Improved vehicle integration for optimized packaging space



**COOLING SOLUTIONS**  
Capability to integrate thermal-management solutions with power sources

# Off-Highway Segments

## Mobile

Dana leverages our global expertise to engineer the most advanced, customized product solutions for developed and emerging markets. Our drive and motion products serve a wide range of demanding industries, including applications for equipment with wheel and track drives as well as stationary machines.



### Agriculture

Our products are engineered to support increased crop yields, optimized harvesting operations, lower emissions, improved operator safety and comfort, and reduced total cost of ownership while complying with evolving emissions standards.



### Construction and Forestry

Integrated drive and motion systems from Dana enhance construction and forestry equipment performance, efficiency, and productivity with a range of solutions for vehicles ranging from 3 to 50 tonnes (4 to 55 tons). Spicer® axles, wheel drives, transmissions, driveshafts, and Brevini™ motion products are integrated with the most advanced technologies for improved machine operation on any job site, in any condition.



### Material Handling

Our customized drive and motion systems enhance material-handling vehicle performance, productivity, and power. Spicer® transmissions, axles, and driveshafts are designed to work seamlessly in any vehicle to allow operators to engage, lift, and transport heavy loads with more precision.



### Mining

Dana designs complete drive and motion systems to meet increasing industry demands for automation and productivity, coupled with high safety standards. Our solutions are specially engineered to maximize vehicle performance in extremely harsh environments.



# Leading the Charge in Vehicle Electrification

Dana is a leading drivetrain and motion systems provider for electrified off-highway applications.

Supported by a legacy of innovation in conventional drivetrains, Dana is at the forefront of integrating mechanical and electrical components for alternative propulsion applications. We embrace evolution to be a step ahead in supporting new applications as they emerge and collaborating with customers as they develop tomorrow's vehicles.

## Electrification. **Delivered.**™

### Fully integrated e-Drive and e-Motion systems

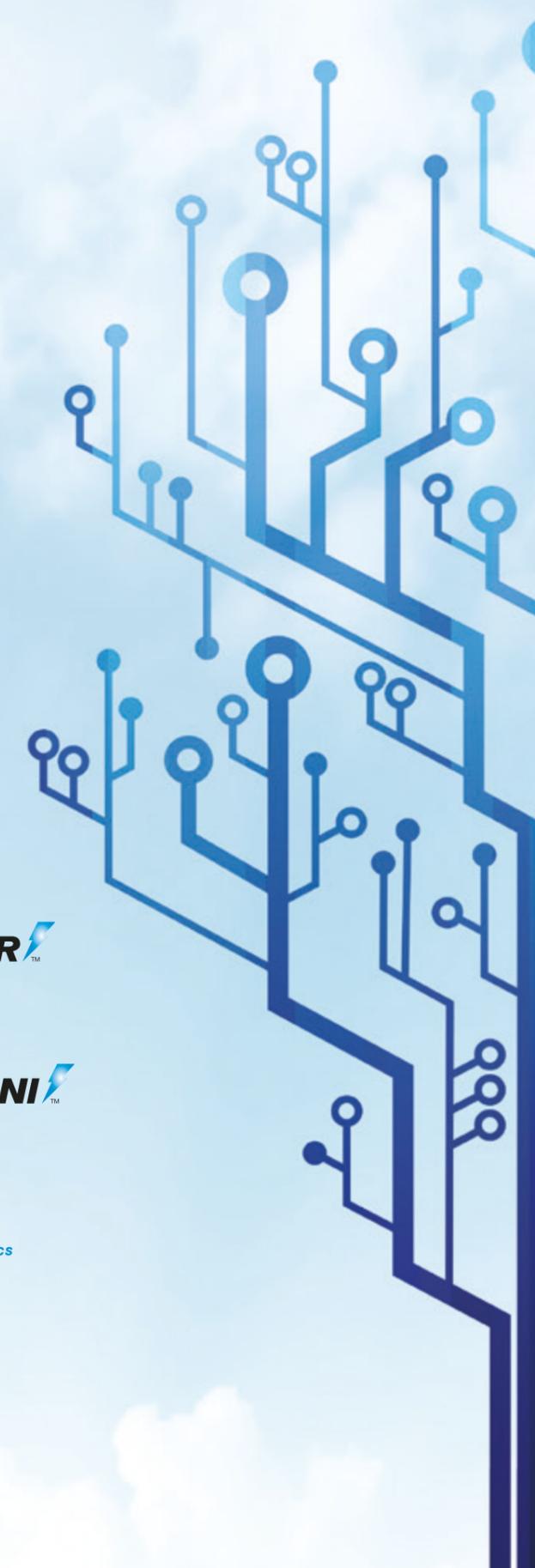
e-Drive Systems



e-Motion Systems



Electric and Hybrid e-Drive Systems



# Fully Integrated e-Drive and e-Motion Systems for your Agriculture vehicles

The agriculture industry is facing unprecedented change from rising global demand, market diversification, and the drive toward more environmentally responsible farming. Dana is strategically positioned to help OEMs navigate the changes in the agriculture sector through a global footprint, decades of vehicle engineering expertise, and a diverse and growing portfolio of innovations that include next-generation clean-energy technologies.



Cattle Feeder Mixer



Tractor



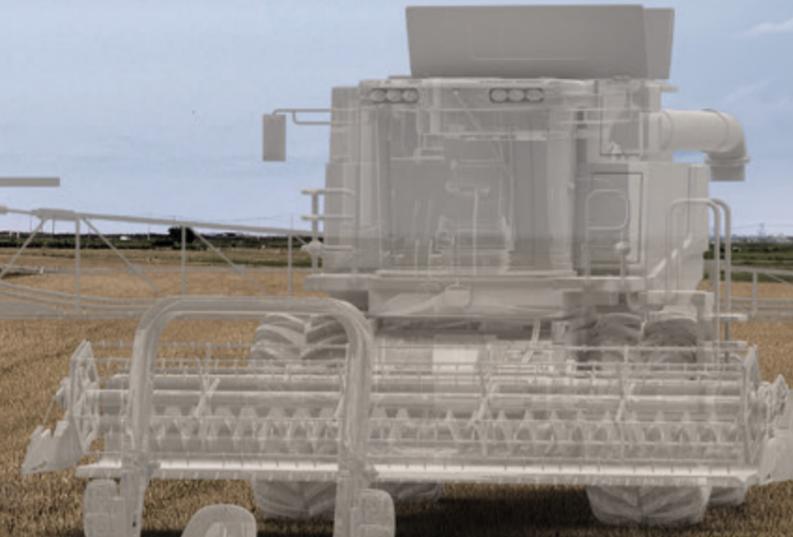
Telehandler



Windrower



Sprayer



Combine Harvester



Zero Turn Mower



Compact Electric Tractor

# Full-System Solutions for Tractors

Tractors are growing in size to improve yield, with increased specialization across geographies and crop requirements. Dana offers Spicer® modular axles, suspended axles, and independent suspension axles that deliver improved speed and operator comfort, as well as highly engineered Graziano™ shifting solutions for enhanced performance and efficiency.



## Spicer® Independent Suspension Axle

- Improved traction and increased speed
- Decreased body vibration and enhanced maneuverability
- Transit speed up to 60 Km/h



## Spicer® Mono-Suspension Axle

- Active suspension system enhances driving quality and comfort
- Improved maneuverability and traction
- Easy of assembly
- Improved controllability in transit



## Spicer® Modular Axle

- Flexible platform assembled from three interchangeable modules
- Cost-effective technology reduces product development lead times
- Available with suspension connection



## Spicer® Portal Axle

- Designed for compact utility tractors
- Increased ground clearance, enhanced traction and performance
- Smooth turning capability
- Suitable for all terrain applications



## Spicer® Driveshaft

- Multiple driveshaft and end-fitting combinations
- Designed for minimal maintenance, longer life and reduced operating cost



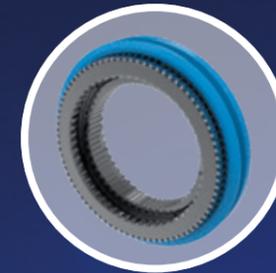
## Graziano™ Bevel gear sets

- State-of-the art gear technologies – Gleason and Klingelberg
- Fine-tuned micro-geometry to minimize noise and optimize durability



## Graziano™ Synchronizer DC 95/100

- Double cone solution for faster synchronization time
- Higher engagement torque in the same size
- Reduced axial package with overall transmission weight saving



## Graziano™ Synchronizer SC 184

- Three sizes with single or double cone modular design
- Reduced axial package with overall transmission weight saving
- High torque capacity up to 27,000 Nm



## Graziano™ Synchronizer TC 102/110/118

- First triple cone design for agricultural market
- High power density in compact radial package
- Integrated activation system for long life
- Special friction material developed for high stress capacity



## Graziano™ Synchronizer CSS

- Roller working ramp obtained on the tooth flank of the sliding sleeve
- Wider friction surfaces in same envelope
- Simpler and stronger hub geometry minimizes heat treatment deformations
- Optimized synchro ring geometry reduces stress and knocking effect



## Graziano™ Powerhifft units

- Designed for high efficiency, enhanced shifting performance, and driver comfort
- Electron Beam Welding Technology minimizes distortions



## Comprehensive design methodology for integrated suspension solutions

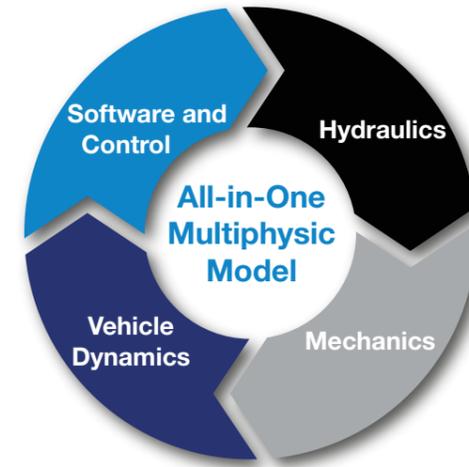
As the market expands for high-performance, feature-rich tractors, Dana supports OEMs by reducing the development time of **complete suspension solutions**.

Our engineers use an advanced **multiphysics approach** to produce virtual prototypes and conduct **real-time simulations** that help reduce development time and accelerate the introduction of new vehicles to market.

Dana's engineering capabilities are especially valuable for OEMs with limited in-house resources.



## Multiphysics Approach Produces All-in-One Model



Our engineers use a powerful software and simulation toolbox to model the complexity of advanced suspension systems across multiple dimensions, including vehicle dynamics, mechanics, hydraulics, and software and controls.

Reduced design time

Identification of the optimized solution

Risk of experimental iterations reduced

## Proven Process for Complete Suspension Solutions

We have leveraged our decades of expertise in agriculture equipment to cultivate a sophisticated, all-encompassing development methodology that optimizes the performance of suspension solutions.

- Improved vehicle traction
- Better handling
- Greater operator comfort

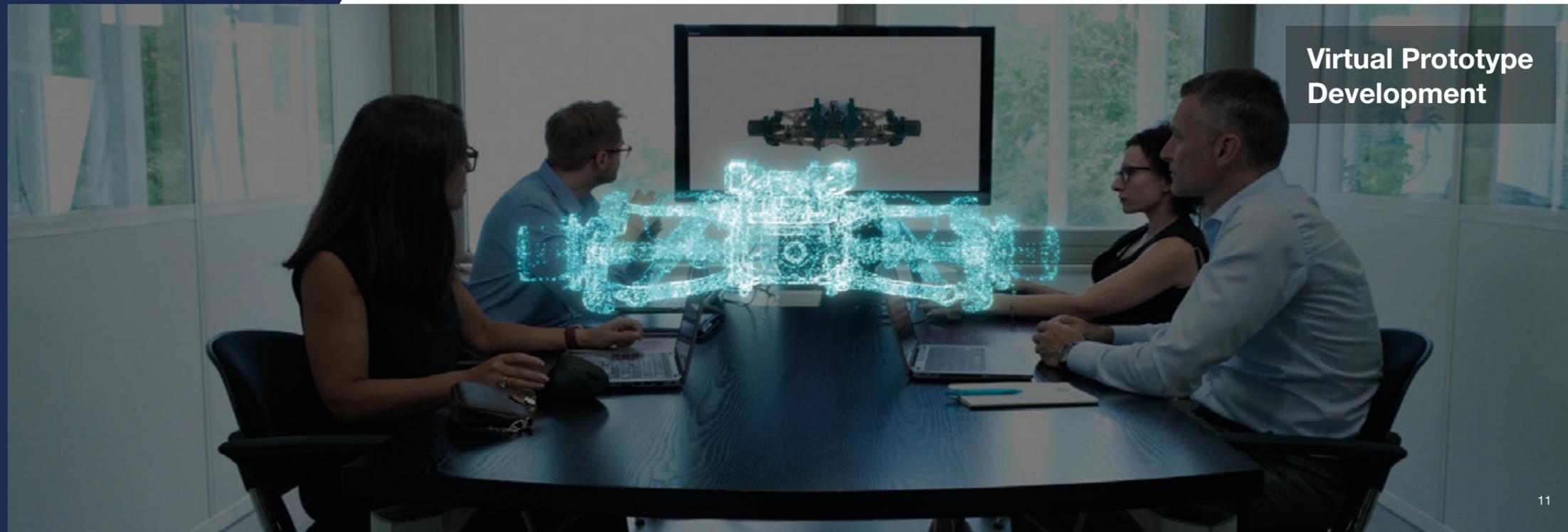
## Enhanced Suspension System Performance

Our comprehensive approach produces fully integrated suspension systems that excel across every aspect of performance and deliver unmatched long-term value.

- Vehicle performance definition
- Comprehensive data acquisition
- Virtual prototype development
- Real-time simulation
- Prototype test track validation

### Characterization of Vehicle Performance

Define Comfort and Handling KPIs



### Virtual Prototype Development

# Full-System Solutions for Compact Electric Tractors

Ideal for small farms, livestock operations, and equestrian centers, compact electric tractors offer a compelling combination of torque, power density and emissions-free operation. Dana supplies e-Propulsion drive solutions and vehicle integration expertise to meet the performance expectations of this fast-growing segment of the market.



## TM4 ElectroDynamics™ SRIPM eMobility motor

- Premium motor technology
- Multiple solution including IPM and SR and SRIPM
- Superior Efficiency level



## TM4 ElectroDynamics™ e-Pump Motor

- Effective performance and operation with a compact design
- SYR and IPM technology for high-efficiency
- Modular approach



## TM4 ElectroDynamics™ Next Gen - Series LVI400 Low Voltage Inverter

- Most power-dense inverter with patented in-house MOSFET multilayer power modules
- Open and fully flexible application software configuration



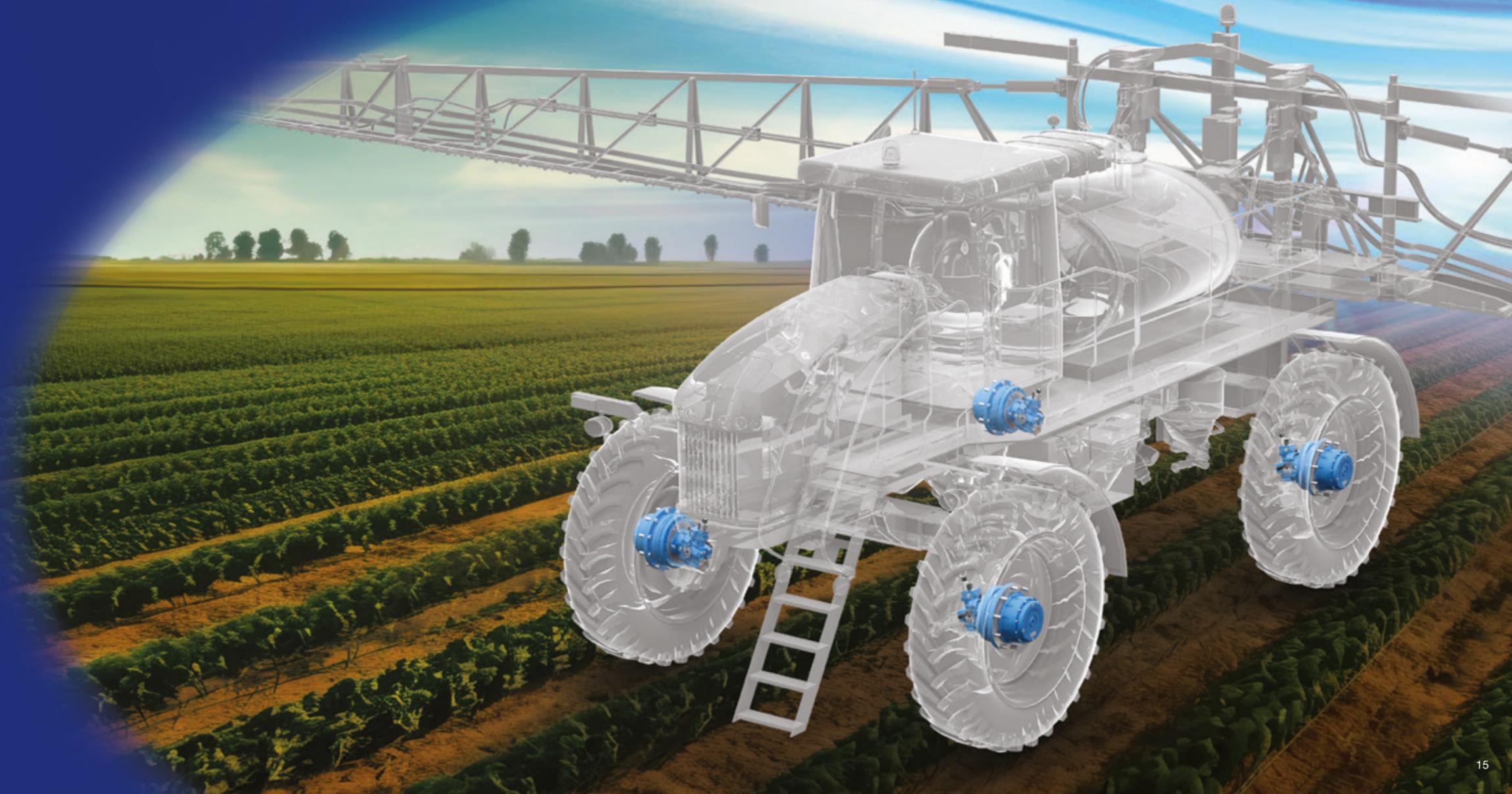
# Full-System Solutions for **Sprayers**

Precision farming, increasing sizes of farms, and sustainable agriculture practices are driving the demand for improved sprayer performance. Spicer Torque-Hub™ wheel drives are specifically designed to improve speed, maneuverability, efficiency, and safety.



## **Spicer Torque-Hub™ C0 Series**

- Patented service brake to meet on-road stopping requirements
- Heavy duty main bearings and retention for high wheel offsets and side loads
- High speed thermal stability for fast operating machines
- Low maintenance requirements and easy to service



# Full-System Solutions for Telehandlers

Offering a rare combination of efficiency, versatility, sustainability, and power, telehandlers have become the workhorses for a wide variety of tasks on the farm. Spicer® drivetrain systems and Brevini™ motion systems support powerful, efficient, and safe performance on the worksite while maximizing speed and fuel economy on the road between tasks.



## Spicer® Planetary Steering Axles

- High driveline efficiency
- Reduce heat generation and minimize power loss



## Spicer® Driveshafts

- Ideal for the rigorous demands of most mobile off-highway applications
- Designed for minimal maintenance, longer life, and reduced operating costs



## TM4 Electro Dynamics™ e-Pump Motor

- Effective performance and operation with a compact design
- SYR and IPM technology for high-efficiency
- Modular approach



## Spicer® Electronic Controls

- Enables communication between driveline components
- Support for OEM advances in digitalization and automation



## TM4 Electro Dynamics™ Next Gen - Series LVI400 Low Voltage Inverter

- Most power-dense inverter with patented in-house MOSFET multilayer power modules
- Open and fully flexible application software configuration



## Graziano™ Shifting Solutions

- High-efficiency powershifts
- Enhanced shifting performance and driver comfort



## Spicer Electrified™ eSG001

- High-efficiency single-speed
- Ideal for high-performance motors
- Compact and light



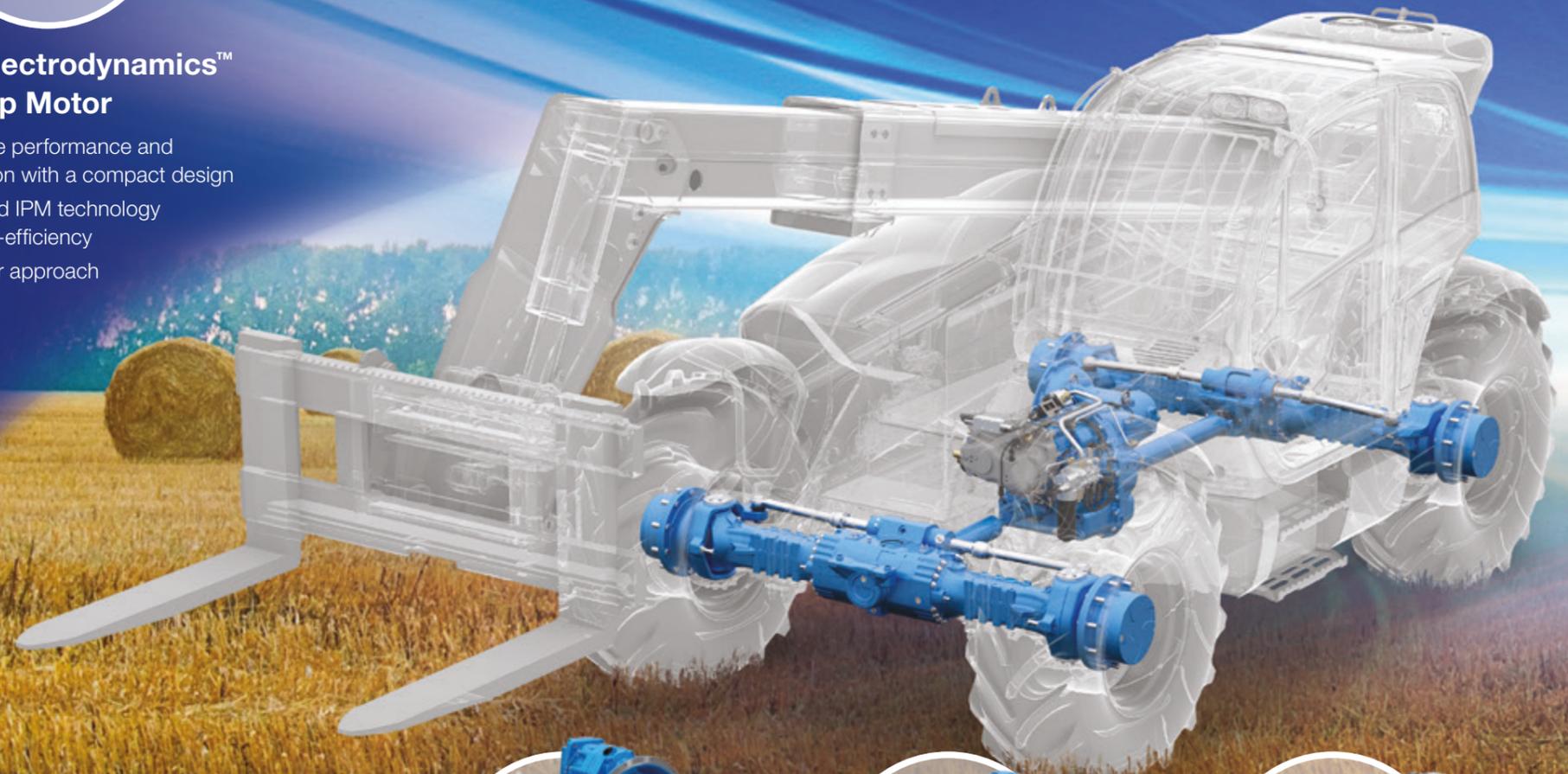
## Spicer Electrified™ eSG101

- High-efficiency single-speed
- Ideal for high-performance motors
- Enhances vehicle mobility



## Spicer Electrified™ eSG102

- High-efficiency, two speed
- Ideal for high-performance motors
- Enhances vehicle mobility



## Spicer® Hydrodynamic Transmissions

- Advanced electronic controls
- Highly-efficient aluminum-cast converter



## Spicer® Hydrostatic Transmissions

- Allows forward, reverse, and braking with hydrostatic motor
- Delivers high torque at low speeds



## Spicer® HVT

- Maximizes fuel savings
- Precise low-speed maneuvering control
- Increased travel speeds

# Full-System Solutions for Combines Harvesters

Combine harvesters are expected to maximize throughput regardless of the weather conditions. Our Spicer® drivetrain and Brevini™ motion solutions for combines and forage harvesters are engineered for superior performance, maneuverability, and durability in the field as well as optimal speed and fuel consumption on the road between crops.



## Spicer® Gear Box

- Modular concept, two or three speeds
- Shift on Fly, stand-still shifting option available
- Integrated Service and SAHR
- Wet Brake "self-adjust"



## Spicer® Rear Adjustable Axle

- Ideal for application requiring different flange to flange
- Compact full retract dimension for shipping purpose
- Disconnect option improves traction at low speed and maximize efficiency at high speed
- Optimize lubrication oil quantity, limited to center section and final hub



## Spicer® Rear Mono-Suspension Axle

- Active suspension system enhances driving quality and comfort
- Improved maneuverability and traction
- Easy of assembly
- Improved controllability in transit



## Spicer® Rear Standard Axle

- Four-wheel drive configuration for more maneuverability and traction
- Improved controllability in transit



# Full-System Solutions for **Windrowers**

Windrowers are built to move quickly and precisely across fields and on the road. We supply Spicer® drivetrains engineered for durability and maneuverability on uneven terrain as well as speed and economy on the highway.



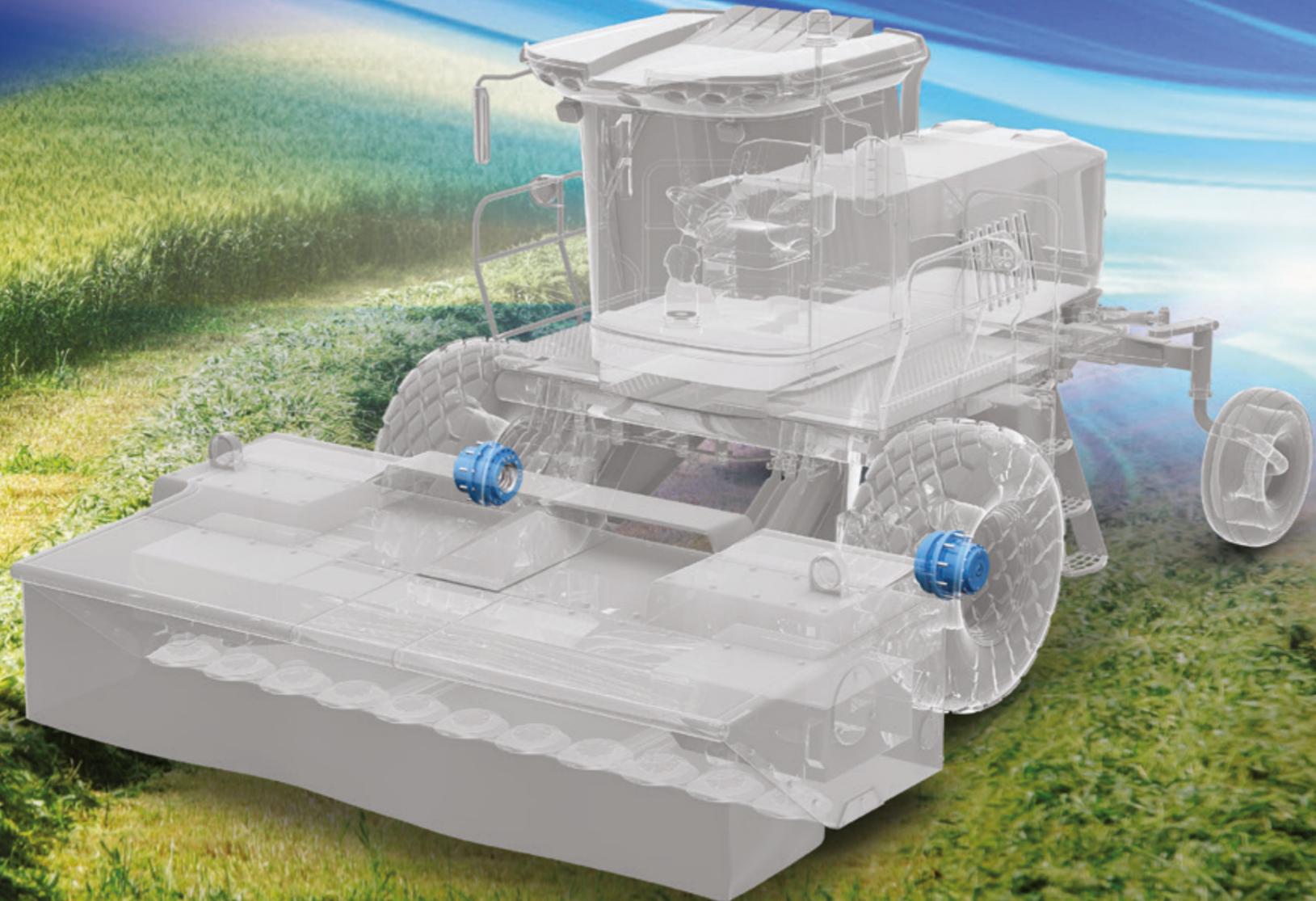
## **Spicer Torque-Hub™ C0 Series**

- Patented service brake to meet on-road stopping requirements
- Heavy duty main bearings and retention for high wheel offsets and side loads
- High speed thermal stability for fast operating machines
- Low maintenance requirements and easy to service



## **Spicer Torque-Hub™ HW5 Model**

- Heavy duty main bearings and retention for high wheel offsets and side loads
- High speed thermal stability for fast operating machines
- Low maintenance requirements and easy to service



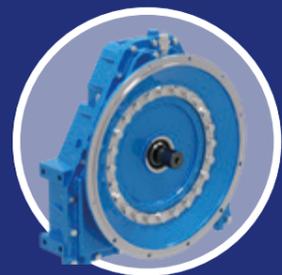
# Full-System Solutions for Self Propelled Cattle Feeder Mixers

As a single-source supplier for self-propelled cattle feed mixers, we offer Spicer® drive and Brevini™ motion technologies that maximize performance through a potent combination of torque, maneuverability, efficiency, and throughput capacity.



## Spicer Torque-Hub™ CT Series Track Drive

- Wheel drive equipped by hydraulic or electric motors
- Robustness, compactness and reliable solution to match the high performances required by agriculture machines
- Parking and dynamic braking system integrated
- Mechanical disconnect device for towing



## Brevini™ Pump Drive

- Input Power up to 480 kW
- Suitable for internal combustion engine or electric motor as input
- Output connection for 2, 3 or 4 hydraulic pumps
- Additional pump for lubrication or cooling system available on request.



## Spicer® Axle

- Multiple configurations available
- Bevel set and two different hub reduction sizes produce different ratios
- Suitable for hydrostatic or hydrodynamic drivelines
- Different design implemented to fulfill market demand



## Brevini™ Slewing Drive

- Robust output frame to sustain and drive the auger
- Maximum output torque up to 48 kNm
- Integer shaft flange frame mounted
- Strong construction and high bearings capacity layout



## Spicer® Driveshaft

- Multiple driveshaft and end-fitting combinations
- Designed for minimal maintenance, longer life and reduced operating cost



# Full-System Solutions for Zero-Turn Mowers

Our Spicer Torque-Hub™ electrified drives and TM4 Electrodynamic™ electric motor technologies for zero-turn mowers deliver maneuverability and speed in a compact solution that provides superior performance while minimizing emissions.



## Spicer Torque-Hub™ eS10S

- Engineered to fulfill industry targets for performance, serviceability and durability
- Internal electric parking brake design for maximum holding power
- Integrated Dana TM4™ IPM advanced motor technologies for greater efficiency with compact size and weight
- Mechanical Disengage for ease of towing under no power condition
- IP67 motor protection from environmental hazards



## Spicer Torque-Hub™ eS10H

- Dana TM4™ IPM and ASY advanced motor technologies for greater efficiency with compact size and weight
- Compact three-stage planetary gear design provides superior gradeability
- Mechanical Disengage for ease of towing under no power condition
- IP67 motor protection from environmental hazards
- Integrated motor options for design flexibility



## Spicer Torque-Hub™ eSAW04

- Dana TM4™ IPM and ASY advanced motor technologies for greater efficiency with compact size and weight
- Compact three-stage planetary gear design provides superior gradeability
- Integrated motor options for design flexibility



## Spicer Torque-Hub™ eIPM120

- Effective performance and operation with a compact design
- IPM technology for high-efficiency
- Modular approach



## TM4 Electrodynamic™ Next Gen - Series LVI400 Low Voltage Inverter

- Most power-dense inverter with patented in-house MOSFET multilayer power modules
- Open and fully flexible application software configuration



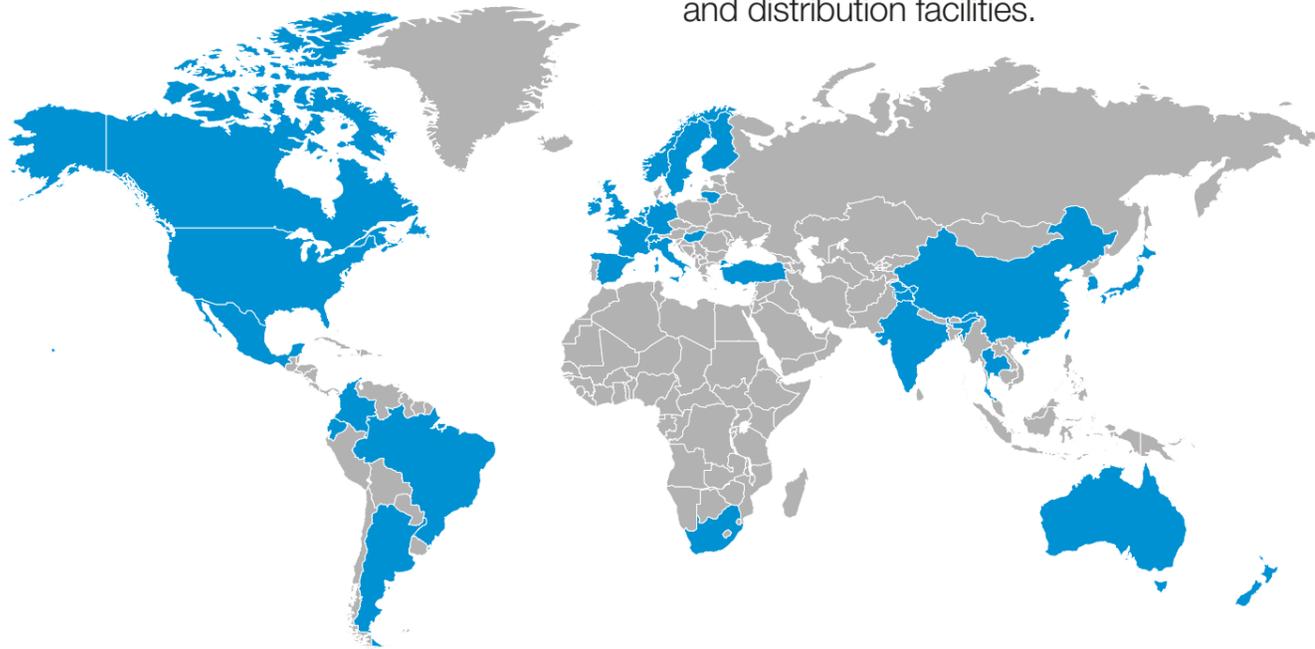
# Global Strength

One of the ways we create value is by **positioning** our technical and manufacturing resources where customers need us globally.

Today, that's **31 countries** on **six continents**.

To help customers achieve success, top-tier suppliers must have a global perspective that can be adapted to meet local requirements and end-user expectations.

Dana's **worldwide leadership** is the key to serving clients around the world. We bring our global expertise to the local level with technologies customized to individual requirements through a network of strategically placed technology centers, manufacturing locations, service and assembly centers, and distribution facilities.



Our global logistics network extends our strength across six continents

# Aftermarket Services

Our global expertise is delivered to customers at a local level through a constantly growing and improving aftermarket network. Strategically placed service centers provide solutions tailored to individual specifications by an experienced on-the-ground support team. We meet customer needs in every region, on every platform.



## Genuine Parts

Dana service parts are manufactured by Dana to the same high standards as original equipment (OE), because they are OE genuine parts. When a part is replaced, a complete interchangeability with existing parts provides total product compatibility, with no change in part numbers. A non-original component can lead to significant vehicle costs down the road. We protect your vehicle's durability and performance.

## Dana Distribution Centers

Dana's global network of distribution centers located in Europe, the Americas, Asia, and Australia offer efficient service points supporting regional customer service, inventory, logistics, and packaging operations.

## Danaaftermarket.com

### E-Commerce Platform

Our technology-enabled e-commerce platform brings Dana's global off-highway network of distribution centers, products, services and premium brands to your device 24/7 to make better decisions, speed up your operations, and make it easier to do business with Dana

Using Danaaftermarket.com, you can quickly:

- Search for part level detail
- View global availability in real time
- Place orders from your phone, desktop or tablet
- Access educational brochures, videos and training
- Order management documentation communicated in real-time
- API developer portal enables cross-platform integration and real time data exchange

### Spicer® drivetrain catalog

The new online Spicer® product Catalog features our extensive off-highway axles and driveshaft portfolio. Quickly and conveniently locate products by model type or part number through the search functionality, and access usage descriptions and technical details to select optimal products for every aftermarket need. The product database is always updated as new technologies become available.

# Market-Driven **Innovation**

## Off-Highway Performance Expectations

Safety

Productivity

Maneuverability

Durability

Serviceability

Total Cost of Ownership

### **About Dana Incorporated**

Dana is a leader in the design and manufacture of highly efficient propulsion and energy-management solutions for all mobility markets across the globe.

The company's conventional and clean-energy solutions support nearly every vehicle manufacturer with drive and motion systems, electrodynamic technologies, thermal, sealing, and digital solutions.

### **About Dana Off-Highway Drive and Motion Systems**

Dana delivers fully optimized solutions to customers in the construction, agriculture, material handling, mining, forestry, and industrial markets.



[Dana.com/oh](https://www.dana.com/oh)

#### **Application Policy**

Capacity ratings, features, and specifications vary depending upon the model and type of service. Application approvals must be obtained from Dana; contact your representative for application approval. We reserve the right to change or modify our product specifications, configurations, or dimensions at any time without notice.

